

Collaborative Problem Solving Platform with Solution Recommendation

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Abstract—The traditional method of problem solving involves the problem and a practise area, but there is no room for one-on-one communication in which one can teach or learn from another person. This is no longer sufficient because one-on-one communication has become the standard while solving problems nowadays. And while solving each problem, the user must search for the optimal solution if they don't have the problem solution, thus finding the solution for the problem takes a considerable amount of time. If one person wants to teach the other, they both must be on a video/audio call in order for them to communicate and work together to understand the problem. They also need to share the screen so that both can able to view the code and can able to debug it. This entails a lot of frantic work. In this project, we propose a solution using a webapp for problem solving practise that includes features such as code collaboration, peer-to-peer audio and video interaction, allowing two or more people to work on the same problem while the editor is shared among all the connected members. Interviewers can also use this collaborative coding platform to conduct a coding interview with a candidate for a problem-solving round.

Index Terms— One-on-.communication, audio/video interaction, problem-solving, web app.

I. INTRODUCTION

The traditional platforms available for practising problem solving includes only the room for problem solving. Practicing problem solving helps the people to improve their coding skills. But it is not that easy because mastering problem solving demands immense practicing. The conventional coding platforms allows the users to select a problem on various domain like database, rest api and so on... The conventional platforms allow the users to solve many problems and they also keep a track on the progress of the users which helps the users to improve themselves. But the conventional problem-solving platforms don't allow users to connect to each other which paves the way for one-on-one learning and guidance. The users have to use another platform to enable the communication which may be of video or audio. Still, they can't able to collaborate on a single editor. After finding the problem users cannot able to solve the problems on their own without learning about the concepts. Some of the conventional platforms like leetcode provide solution only to a few problems and for the remaining it demands us to pay a subscription fee.

II. RELATED WORK

The Literature Survey was carried out in great detail in [1]

Mandeep Kaur, Manpreet Singh, Harneet Kaur, Simran Kaur proposes a collaborative environment for editing the code document through combination of web sockets, code mirror and ajax requests are used. The author uses operational transformation to achieve collaborative editing.

Iwan Briquemont, Manuel Bravo, Zhongmiao Li and Peter Van Roy [2] proposes that in distributed computing, a conflict-free replicated data type (CRDT) is a data structure that is replicated across multiple computers in a network, with the following features: The application can update any replica independently, concurrently and without coordinating with other replicas.

Prof.Smita Deshmukh, Dimple Sarode, Shraddha Sonare, Shweta Yadav [3] proposes an application that provides an automated testing and evaluation environment for all Candidates appearing for the interview. And developed all the required functionalities for authentication, administration and video interviewing of candidates. The scoring of code submission is automated which helps interviewers effectively hire candidates based on their coding skills.

Sahil Pandita¹, Aswanth Surendran, Rishiraj Thadeshwar, Ashish Nahak, Prof.Ujwala Gaikwad [4] proposes a web application that allows users to edit code in browsers, which allows for multiple language support and different themes. The editor has features such as syntax highlighting, code intellisense, and command palette. The code is then captured in a file and sent to the server, where it is run by accessing the terminal and the output of the terminal is sent to the browser, allowing users to run different code without the need for different compilers and interpreters.

Jelena Caiko, Antons Patlins, Arapov Nurlan, Vladimir Protsenko [5] software to create user's own video conferencing service that can be deployed using a virtual server. It is an open-source program that allows user to secure audio/video calls and conferences, streaming and desktop sharing, instant messaging, file transfer and many others. To use it, user do not need to register an account and the program itself works in a browser.

Zinah Tareq Nayyef, Sarah Faris Amer, Zena Hussain [6] proposes a web application using WebRTC technology with secure and high data transmission between users as peer-to-peer or peer-to-group connection in real-time communication, therefore anyone can create their own webpage or application such as real-time sharing files, communication environment as messaging chat or video/audio conferencing this opened the way for programmers and developers to enter the actual job market and compete with social media owners. Using WebRTC allows user to create a webpage with the most powerful features, allowing each user to connect to another via Text messages, video/audio call by using simple JavaScript APIs and Node JS.

Waleed M. Azmy, Ossama Emam [7] proposes a content-based recommendation system that makes recommendations to users based on the content of the items being recommended. The content of the items being recommended can be anything, including but not limited to, text, images, videos, etc.

Sujoy Gupta, Palash Nandy, Michel Joseph Lambert [8] proposes a YouTube recommendation system that could work in a number of ways, but one way it could operate is by tracking the videos that users watch on the site and then using that data to suggest similar videos to other users. The system could also take into account things like the user's search history, the time of day, and the user's location when making recommendations.

III. PROPOSED METHODOLOGY

We propose a webapp solution that is a client-server architecture with a code editor embedded and includes the following features. The webapp enables users to solve problems collaboratively while also assisting them in learning about the problem topics and domain via YouTube and article recommendations.

The proposed system will have the following features,

A. Candidate Authentication

Users can create their own profiles using their email or the user can sign up by providing their email, name and password as shown in the figure 3.2.1. The user can login directly using the Google auth login or using their email and password as shown in the figure 3.2.2.

B. Selecting problem

Users can select problems from the list of available problems with the help of various filters based on the problem domain, status and difficulty level. Figure 3.2.3 shows the filtering of problems based on problem domain. Figure 3.2.4 shows the filtering of problems based on difficulty level. Figure 3.2.5 shows the filtering of problems based on problem status. The user can also search for problems of their interest to solve as shown in the figure 3.2.6.

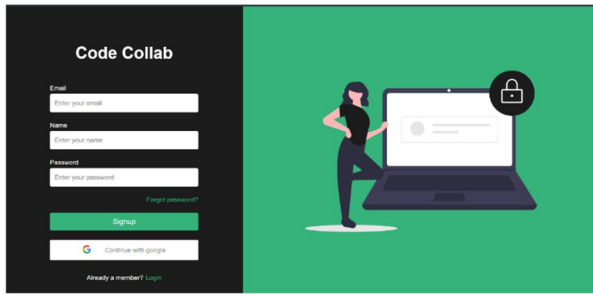


Figure 3.2.1. User signup page

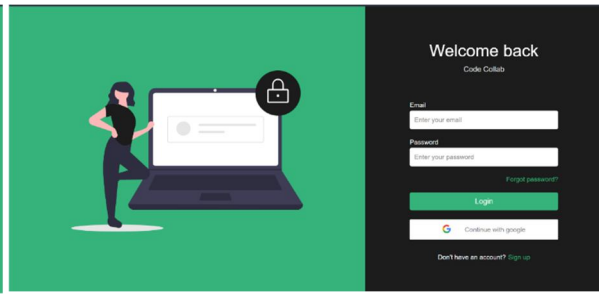


Figure 3.2.2. User login page

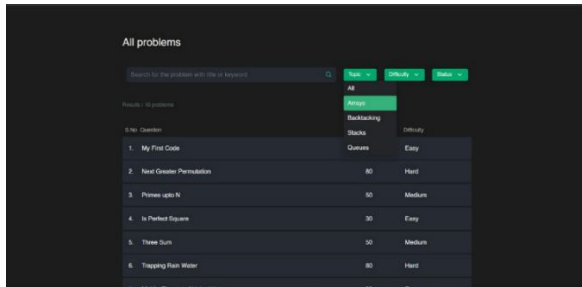


Figure 3.2.3. Problem filtering based on problem domain

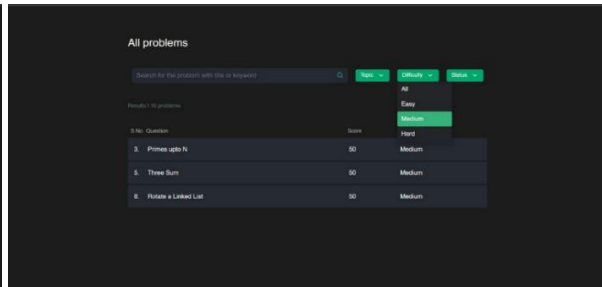


Figure 3.2.4. Problem filtering based on problem difficulty level

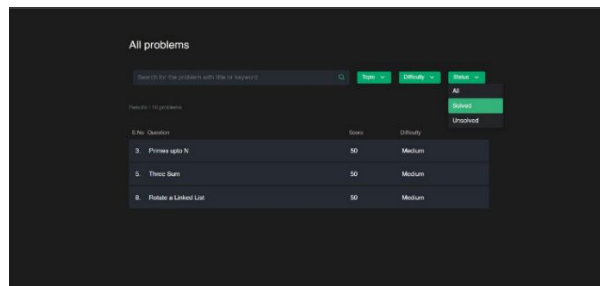


Figure 3.2.5. Problem filtering based on the problem status

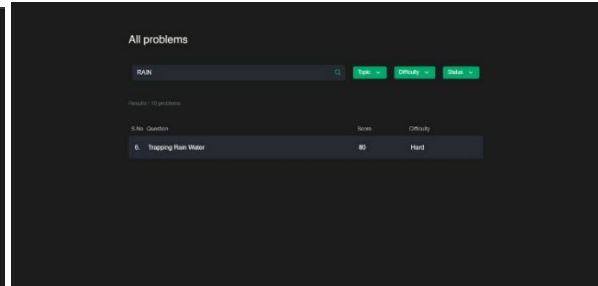


Figure 3.2.6. Problem filtering using the search option

C. Solving problems

users can solve the problem chosen from the list of available problems using any language of their preference. Figure 3.2.7 shows all the available programming languages available in the platform for solving problem. The programming languages that are available now are Python, JavaScript, C, C++ and Java.

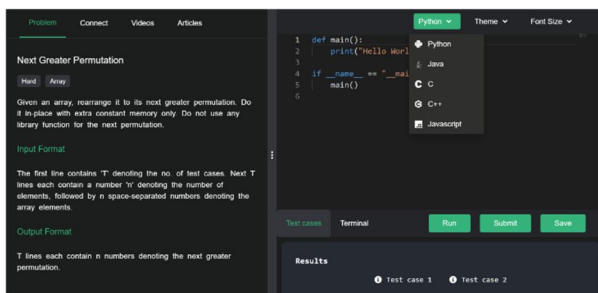


Fig.3.2.7. Selection of programming language in the editor to solve the problem

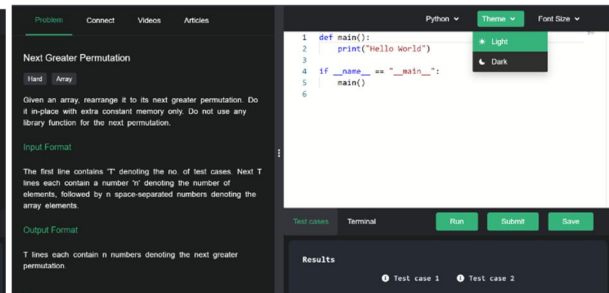


Figure 3.2.8. Editor theme selection

D. Editor options

The editor allows the users to change the editor font size, theme and the language. The editor also provides code linting and intellisense for most of the available languages. The theme selector allows the user to choose light or dark theme for the editor based on their preference as shown in the figure 3.2.8. There is also an option for changing the font size of the editor from the available options as shown in the figure 3.2.9.

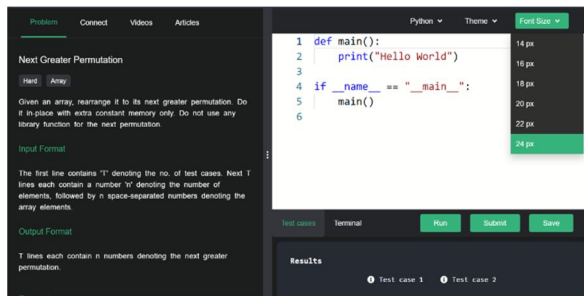


Figure 3.2.9. Editor font size selection

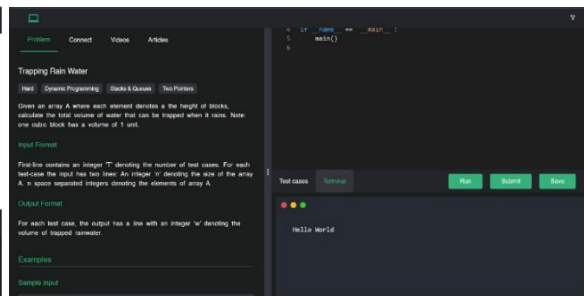


Figure 3.2.10 Code execution result in terminal

E. Terminal

It provides user with a terminal support so the users can able to view the program execution results as shown in the figure 3.2.10.

F. Running Test Cases

Every problem is embedded with multiple test cases so that the efficiency of the code can be examined. Once the program is submitted the user's program will be tested against and the available testcase and the result will be displayed on the test cases tab as shown in the figure 3.2.11.

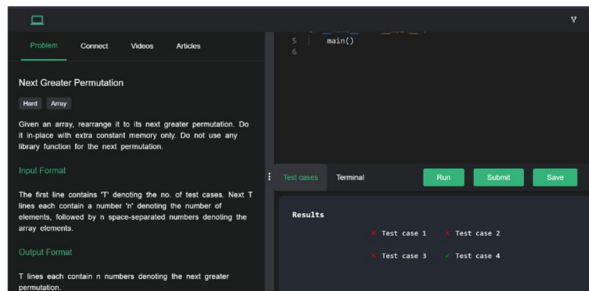


Figure 3.2.11. Testcase results after program execution

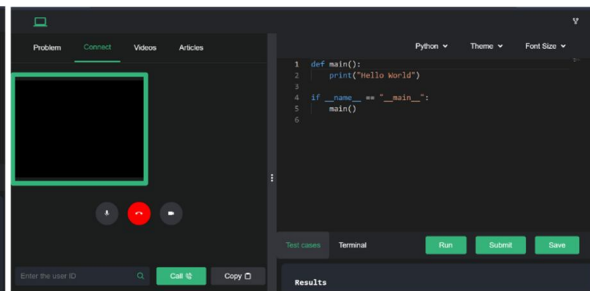


Figure 3.2.12. Copying user ID

G. Call user

Every user will be given with a unique ID and it can be used to communicate with other users. The ID can be shared to the other users. Users can directly call other users in the application with their ID. User's ID can be copied with copy button as shown in the figure 3.2.12. To call a user, their ID should be placed on the text box provided and use the call button as shown in the figure 3.2.13.

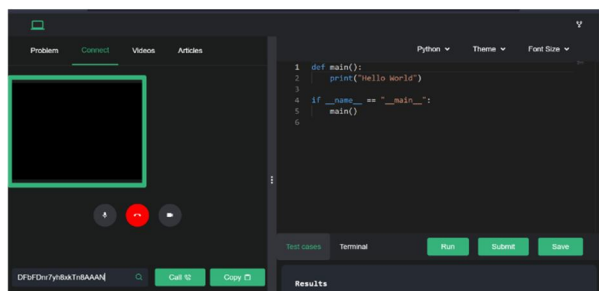


Figure 3.2.13. Pasting the user ID and calling the user

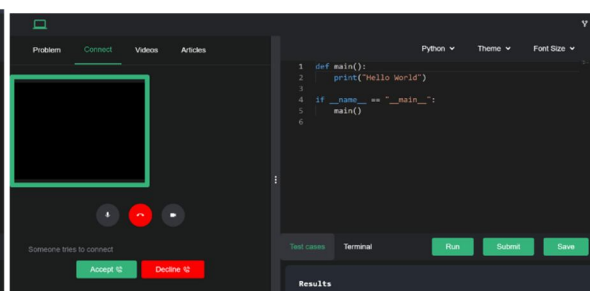


Figure 3.2.14. Incoming call prompt

H. Accept/Decline call

Once a user calls another user. The user will receive a notification about the incoming call and the user can opt to accept /decline the call as shown in the figure 3.2.14. Once accepted both the users will be connected through a socket video call as shown in the figure 3.2.15.

I. Collaborative editor

Once the call has been connected the users will have a shared editor in which both the users can make changes and both can run the test cases. This allows to rectify the problems in the code easily.

J. For interviews

It can also be used for interviewing purposes where the interviewer and the interviewee can be connected on a call and the interviewer can examine the other person easily.

K. Run and save code

The user can run their code and see the results. The code can be saved and edited later by the user as shown in the figure 3.2.15.

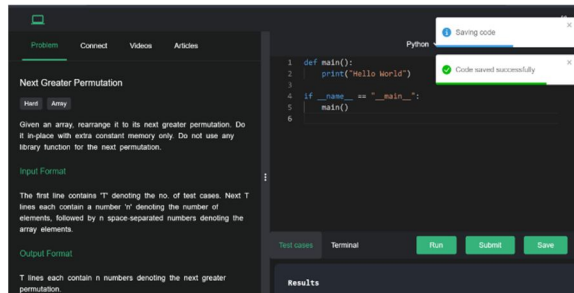


Figure 3.2.15. Saving the user's code

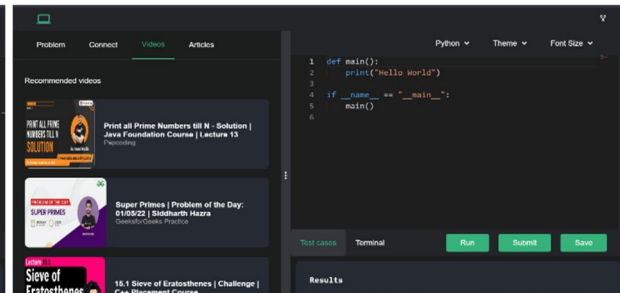


Figure 3.2.16. YouTube video solution recommendation

L. Video and article recommendation

For each problem in the platform the user's are provided with solution recommendation in the form of youtube videos and article as shown in the figure 3.2.16 and 3.2.17 respectively.

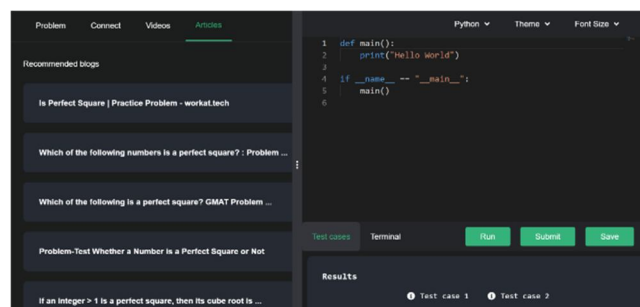


Figure 3.2.17. Problem solution article recommendation

IV. RESULTS AND DISCUSSION

A cloud-based web application that allows users to collaborate while practising coding problems in a shared code editor that supports most of the popular programming languages with audio and video connection, as well as solution suggestions in the form of video lessons and publications has been developed and implemented successfully.

A. User Creation

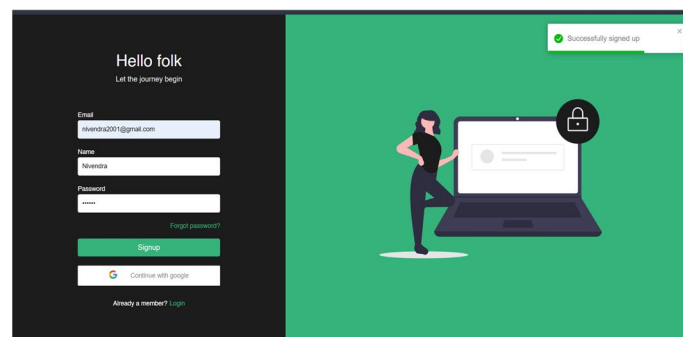


Figure 4.1 Signup page-user creation

B. User Login

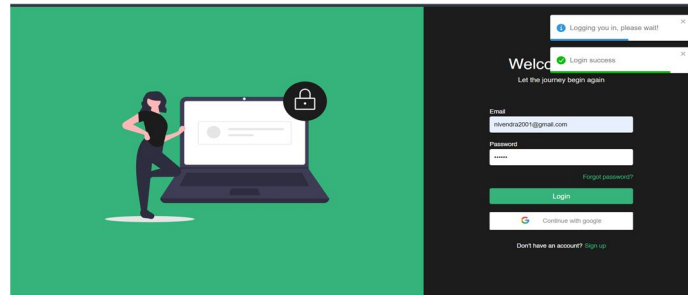


Figure 4.2 login page-user Login

C. Problem Selection

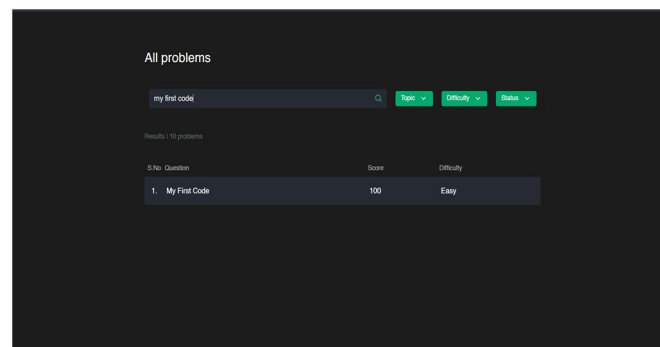


Figure 4.3 All problems page-Problem selection

D. Problem View

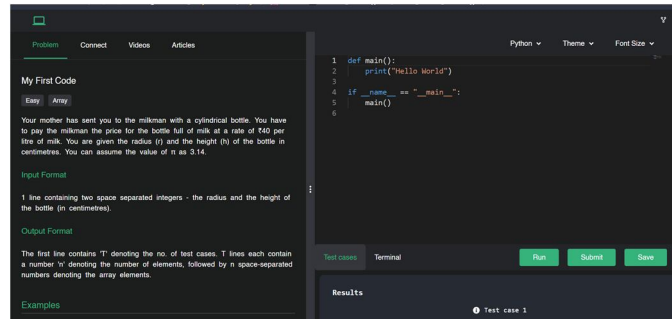


Figure 4.4 Problem view

E. Typing the Solution and Running the Code

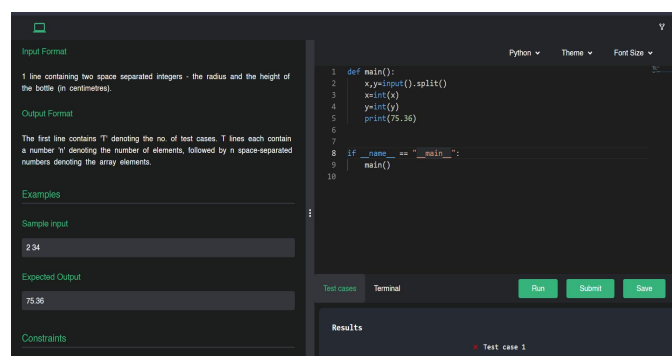


Figure 4.5 Code running

F. Video Recommendation

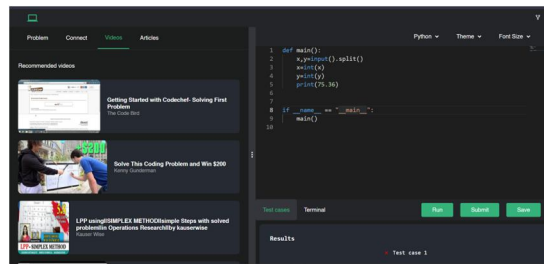


Figure 4.6 Video recommendation

G. Article Recommendations

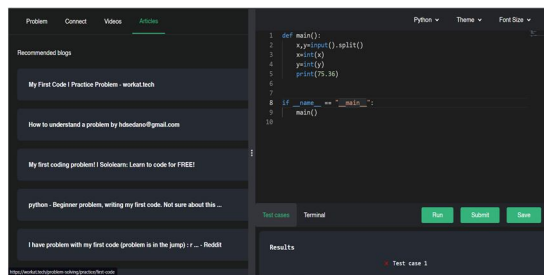


Figure 4.7 Recommended articles

V. CONCLUSION AND FUTURE SCOPE

The collaborative coding platform has been implemented using React JS, Node JS and socket IO. The website supports for all browsers. The app can be improved by including some other features like in-app chatting and viewing other user's profile. And it can also be improved by allowing users to create their own problems and a space or a room to allow multiple users to connect instead of only two people.

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